DATABASE AS A SERVICE ENTERS THE ENTERPRISE MAINSTREAM

2016 IOUG SURVEY ON DATABASE CLOUD

By Joe McKendrick, Research Analyst
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EXECUTIVE SUMMARY

As CLOUD COMPUTING has risen across the enterprise landscape, a new form of information delivery has taken hold. Commonly referred to as Database as a Service, or DBaaS, this approach promises to finally crack the puzzle that has inhibited enterprise data shops for years—the challenge of sharing access to siloed data stores.

A survey of more than 300 DBAs and IT professionals finds growing interest in DBaaS as a viable approach to serving their enterprise's need for greater agility and faster time to market with cloud computing. Many of the early hurdles delivering enterprise capabilities for security and availability in the cloud—become more evident with the reliance on hybrid cloud approaches and need to move enterprise applications to the cloud and back on-premises based on the business requirements of the organization, their legacy investments, and regulatory requirements.

The survey, conducted by Unisphere Research, a division of Information Today, Inc., finds that organizations are employing a range of new strategies and approaches to build a DBaaS capability in their enterprises. Conducted in partnership with Oracle among members of the Independent Oracle Users Group (IOUG), this study represents the views of respondents from organizations of all sizes and across various industries.

Highlights of the research include the following findings:

- Database as a Service (DBaaS) is taking off, with adoption tripling over the next 24 months. There will be a significant amount of enterprise data shifting to the cloud over the next 24 months as well, as enterprises re-think data management in the cloud.

- Enterprise customers see a future with hybrid approaches, relying on a combination of private and public cloud resources. As the number of cloud services within enterprises grows, there will be more reliance on both for cost mitigation, as well as backup and continuity.

- Cloud is increasingly seen as a highly agile and robust platform for enterprise application development. More development work is going to the cloud. Database backup and disaster recovery, along with enterprise applications are the areas seeing the greatest returns from cloud implementations.

- Significant segments of Oracle Database shops are adopting a range of technologies to move their DBaaS efforts forward into their enterprises. Oracle Multitenant, Oracle Enterprise Manager, and Exadata are becoming mainstays for DBAs and professionals seeking to deliver information on-demand to whomever and wherever it is needed.

On the following pages are the results of this survey.

RE-THINKING DATA MANAGEMENT

Database as a Service (DBaaS) is taking off, with adoption tripling over the next 24 months. There will be a significant amount of enterprise data shifting to the cloud over the next 24 months as well, as enterprises re-think data management in the cloud.

Cloud is increasingly becoming a vital part of the data management mainstream, the survey finds. Often looked upon with suspicion and trepidation in its earlier days, cloud computing has become the data management platform of choice among a sizable segment of organizations.

To gauge the progress that cloud will be making as it enters the enterprise mainstream, it is necessary to look at managers' and professionals' expectations 24 months down the road. Notably, there is likely to soon be a major shift in core workloads (databases, applications) to cloud platforms in the near future. The survey finds an impending increase in organizations running significant portions of the workloads (defined as greater than 25%) in the cloud—from a total of 14% today to 43% within the next 2 2 years. (See Figure 1.)

The gradual shift to database clouds is already underway for a number of organizations. Those organizations running the majority of their workloads in the cloud also will see a notable jump— from the current nine percent level to 25% within the next 2 years.

Likewise, it's instructive to look 2 years out at the types of cloud services that will be in use. Clearly, data is at the core of many cloud plans. Adoption of Database as a Service (DBaaS) is set to almost triple over the next 2 years, the survey finds. Seventy-three percent of managers and professionals expect to be using DBaaS within their enterprises by that time, versus 27% at the present time. Platform as a Service or PaaS—of which DBaaS is a part—will also see growth across the board. PaaS, which also involves the invocation of database services as well as associated middleware, is likely to be adopted by 57% of enterprises in the survey. Software as a Service (SaaS)—already a popular option among a majority of enterprises—is seen as reaching a plateau of adoption. (See Figure 2.)

The survey tracks a significant upcoming surge in enterprise data assets moving to the cloud. At this time, about 11% of respondents report that a significant portion of their companies'

data assets (defined as more than 25%) are managed in the cloud. In 2 years, one-third estimate that sizable portions of their data assets will be cloud-borne. (See Figure 3.) "Cloud-based solutions provide greater value for our data, because they enable us to concentrate primarily on our business and leave the infrastructure worries to our service provider," says a respondent.

What types of database workloads are being moved or will soon be moved to the cloud? Dev/test environments dominate, with 45% of managers and professionals in the survey reporting that their developers are building and testing applications within cloud-based environments. More than one-third also report running transactional databases in cloud environments. (See Figure 4.)

What parts of data environments are now accessible through cloud-based interfaces? Close to one-third, in fact, point out that their Oracle Databases themselves are now cloud accessible. Another one-fourth say their non-Oracle databases are cloud-accessible. Analytics is another area now being made accessible through cloud. (See Figure 5.)

When looking at the greatest business benefits organizations expect to see from delivering database services in the cloud, cost cutting stands out. A majority of respondents, 52%, report they are cutting expenses through efficiency gains. Just about as many, 44%, report they are saving money through the elimination of duplication, and a similar number cite higher asset utilization. (See Figure 6.)

Where will database cloud services benefit organizations the most? Database backup and disaster recovery, along with enterprise applications are the areas seeing the greatest returns from cloud implementations, the survey finds. This points to the growing acceptance of clouds into the enterprise mainstream. "Cloud-based solutions can increase productivity, as they reduced any worries over data loss, compared to those from traditional non-cloud-based solutions," one respondent remarked. (See Figure 7.)

Figure 1: What percentage of your enterprise's core workloads (databases, applications) are now running in the cloud, and what percentage do you expect to be running 2 years from now?

	Currently	In 2 years
None at this time	26%	6%
1% to 10%	37%	11%
11% to 25%	12%	21%
26% to 50%	5%	18%
More than 50%	9%	25%
Don't know/unsure	11%	20%

Figure 2: Which cloud services are used by your organization, and which cloud services do you expect to be in use 2 years from now?

	Currently	In 2 years
None	77%	23%
SaaS	60%	54%
PaaS	43%	57%
DBaaS	27%	73%

Figure 3: What percentage of your enterprise data assets are managed in the cloud, and what percentage will be managed in the cloud 2 years from now?

	Currently	In 2 years
None at this time	34%	9%
1% to 10%	33%	15%
11% to 25%	11%	24%
26% to 50%	5%	13%
More than 50%	6%	20%
Don't know/unsure	11%	20%

Figure 4: What types of database workloads are being moved or will soon be moved to the cloud, versus staying on premises?

Archival data warehousing	61%
Develop/test databases	45%
Transactional/production databases	38%
Operational data warehousing	27%
Don't know/unsure	19%
None	19%
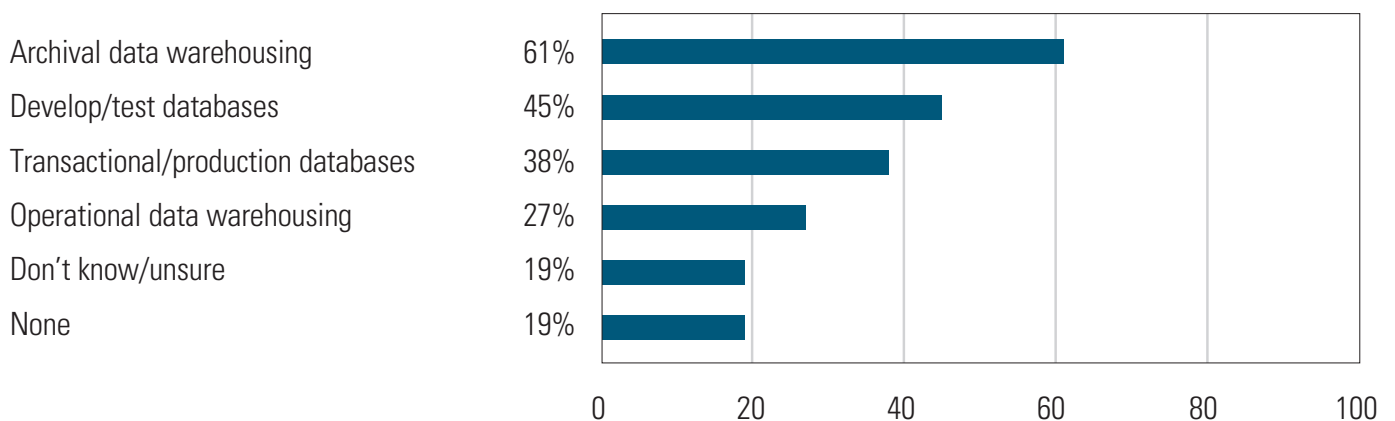
Figure 5: What parts of your data environment are now accessible through cloud-based interfaces?

Oracle databases	29%
Non-Oracle databases	24%
Analytics	23%
Big data	19%
Analytics platforms	18%
Data warehouses	17%
Repositories	11%
Other	1%
None	31%
Don't know/unsure	16%

0   20   40   60   80   100
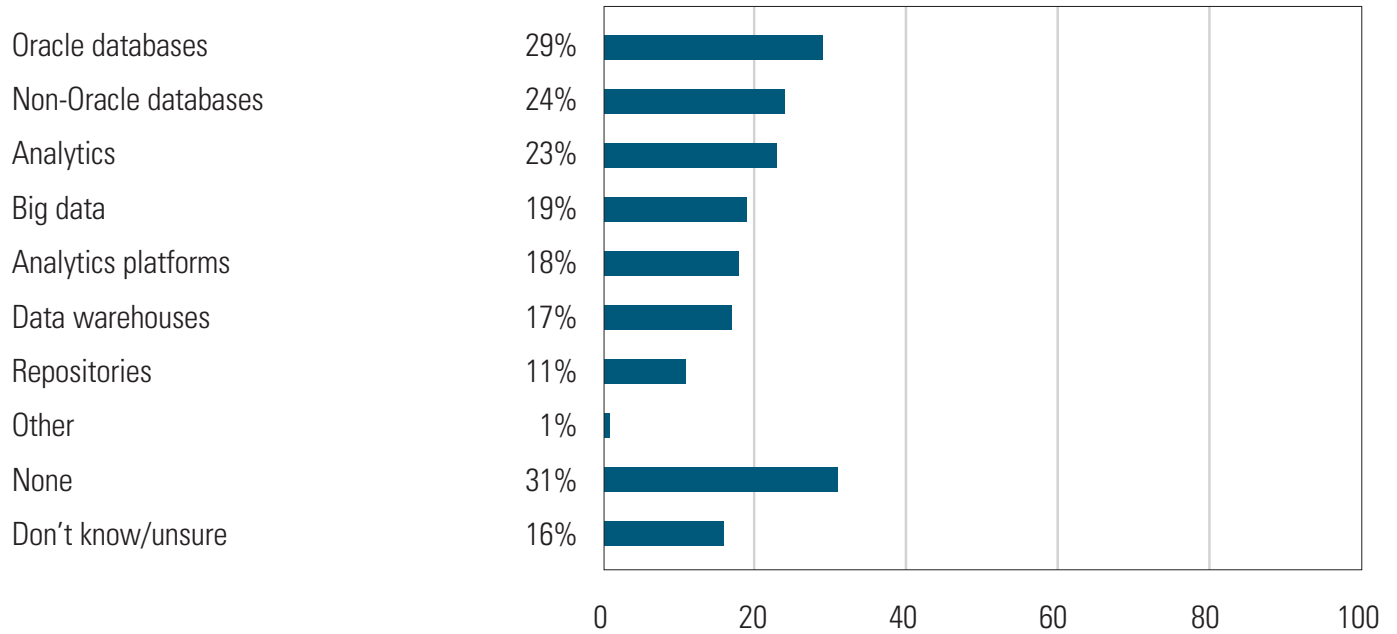
Figure 6: What are the greatest business benefits your organization expects to see from delivering database services in the cloud?

Benefit	%
Save costs by increasing operational efficiency through standardization	52%
Save costs through elimination of duplication/replication of resources/administration	44%
Achieve higher asset utilization through consolidation to reduce costs	42%
Advance business through greater agility and flexibility	34%
Enhance availability, including backup and business continuity	32%
Ability to innovate faster—improve time to market	26%
Accelerate time to market for new application deployment	25%
Increased support for end-user self-service	25%
Reduce "shadow IT" service acquisition	22%
Greater support for mobile initiatives	21%
More control over security and privacy	20%
Greater control over regulatory compliance	14%
Don't know/unsure	15%
Other	2%

Figure 7: Where will database cloud services benefit your organization the most?

Database backup and disaster recovery	55%	
Enterprise applications	55%	
Departmental applications	32%	
Mission-critical applications	26%	
Don't know/unsure	17%	
Other	3%	
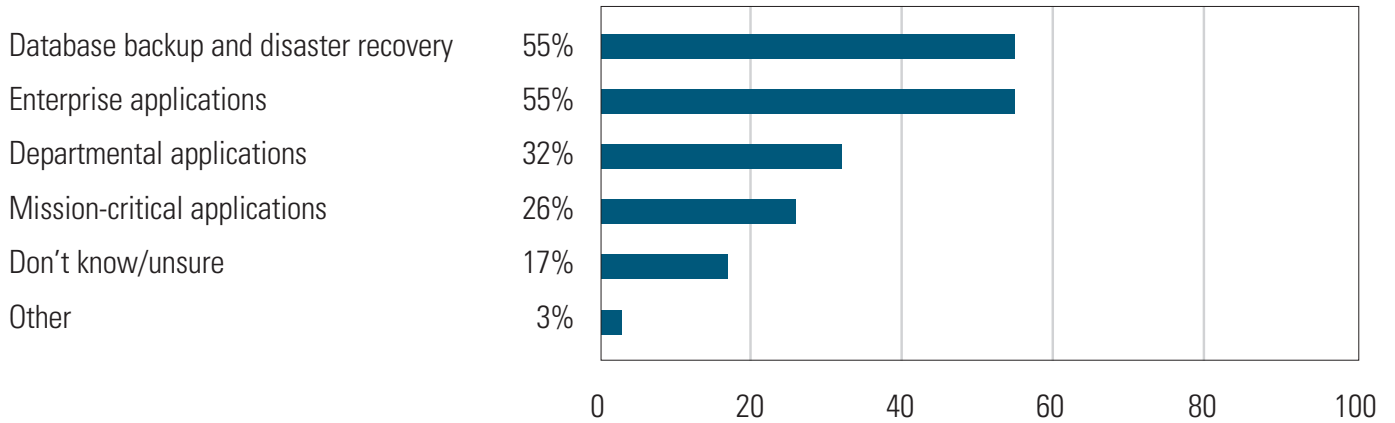
EMBRACING THE CLOUD

Enterprise customers see a future with hybrid approaches, relying on a combination of private and public cloud resources. As the number of cloud services within enterprises grows, there will be more reliance on both for cost mitigation, as well as backup and continuity.

Security and privacy concerns top the list of challenges in building, managing, and using clouds. Half of the managers and professionals in the survey indicate that security and privacy concerns are the greatest inhibitors to their cloud initiatives. Data ownership and retention follow closely behind as the second-ranked concern. Often, trusting outside cloud providers with sensitive or mission-critical corporate data is seen as risky, not only in terms of potential breaches, but also in cases where the relationship between a cloud provider and consumer needs to be modified or terminated. The fate of data held by a cloud provider may not be clear-cut. (See Figure 8.)

As one respondent describes it, "there is definitely value in cloud-based solutions. However, we're being cautious on what we move to the cloud and when we move it to the cloud. We want to ensure that we're gaining the performance and cost savings without affecting the end user's experience."

For most enterprises, private clouds—implemented within the more protective confines of data centers—offer the best path to providing data on-demand to decision makers. It dominates as the most prevalent type of cloud-borne implementation, cited by close to half of respondents. About one-third subscribe purely to public cloud services, while another one-third are leveraging hybrid approaches. (See Figure 9.) "We use a private cloud today, and the value is the ease of provisioning and the ability to meter and provide showback metrics to the business units," said one respondent.

Private cloud may dominate the current data management scene, but from a planning/spending perspective, the future belongs to hybrid approaches. Many organizations continue to maintain an abundance of legacy or on-premises assets, and this is likely to be the case for some time to come. As a result, the largest percentage of organizations in the survey, 44%, see the establishment of hybrid cloud as their most important priority as they enter the cloud space. (See Figure 10.)

In line with the growth in hybrid and private cloud approaches, two in three organizations will be relying on their own internal resources to manage any cloud-borne services.

Private and hybrid clouds are an important element in cloud strategies, and, therefore, for the most part, IT is taking the lead with cloud service provisioning. Sixty-seven percent cite IT as leading the way. Another 27% rely on cloud providers themselves to provide the degree of support required. (See Figure 11.)

Close to one-third now run at least some of their mission-critical applications or dev/test environments on some variation of the cloud—be it private, hybrid, or public, the survey confirms. (See Figure 12.)

How many cloud services will be coming out of DBaaS, PaaS, and SaaS in the near future? For the most part, organizations in the survey currently have between one and 10 cloud services, as cited by 48% of the group. This is expected to shift upward. In 2 years, one-third anticipate supporting or subscribing to a significant number of services—more than 25—up from 7% at the present time. (See Figure 13.)

Cost control is still driving cloud adoption, but agility is also an important driver, the survey finds. At this time, cost control tops the list of business motivators to go to cloud, with close to two-thirds of respondents mentioning the need to reduce operating costs as a justification to go to cloud computing. Similarly, a majority, 53%, cite reduced hardware costs, and 39% prefer cloud since it reduces hardware costs. Of course, cost savings is only one aspect of cloud, and may serve as the initial justification. But additional benefits—particularly in terms of business agility—can gain traction as the initial cost-savings aspects wear off. For example, 44% see cloud as a viable approach to assuring backup and continuity. Another 38% are turning to cloud as it offers the ability to launch or take advantage of new applications. (See Figure 14.)

"Cloud forced us to create much better cost models for our internal hosting environments," said a respondent. "These models demonstrated that it is often more cost-effective hosting ourselves as long as we pay close attention to costs and licensing issues. As cloud costs go down through economies of scale, we expect to leverage such environments further."

Figure 8: What are the challenges of building, managing and using clouds?

Challenge	%
Security and privacy concerns	50%
Data ownership and retention concerns	48%
Software licensing issues	40%
Lack of expertise or knowledge	36%
Regulatory compliance	34%
Gaining cross-organization support or participation	32%
Creating the business case and funding model	32%
Loss of visibility/control of apps, databases, storage or systems	32%
Building awareness of available services	26%
Implementing process, policy and role changes (transformation)	25%
Vendor lock-in or difficulty in switching service providers	23%
Integration of cloud to other clouds or on-premises solutions	21%
Adequately provisioning server and storage capacity	20%
Inability to ensure service levels for applications, databases, storage, systems	20%
Available cloud services do not fit existing functions/processes	19%
Don't know/unsure	15%
Other	1%

Figure 9: What type of cloud is your enterprise currently employing?

Private	48%
Hybrid	31%
Public	31%
Don't know/unsure	26%
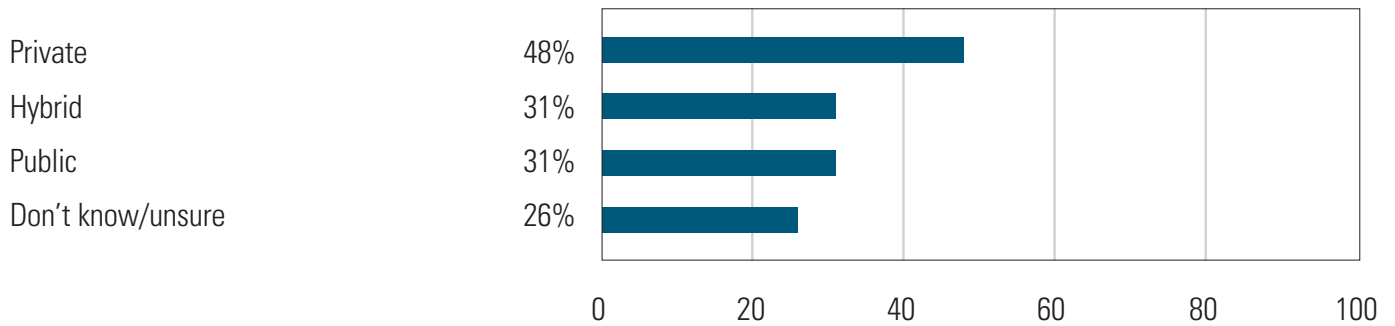
Figure 10: From a planning/spending perspective, what does your organization view as most important in its cloud initiative?

Establishing a hybrid cloud that incorporates both private and public cloud resources	44%
Leveraging public cloud capabilities	16%
Building a pure-play private cloud capability	13%
Don't know/unsure	27%
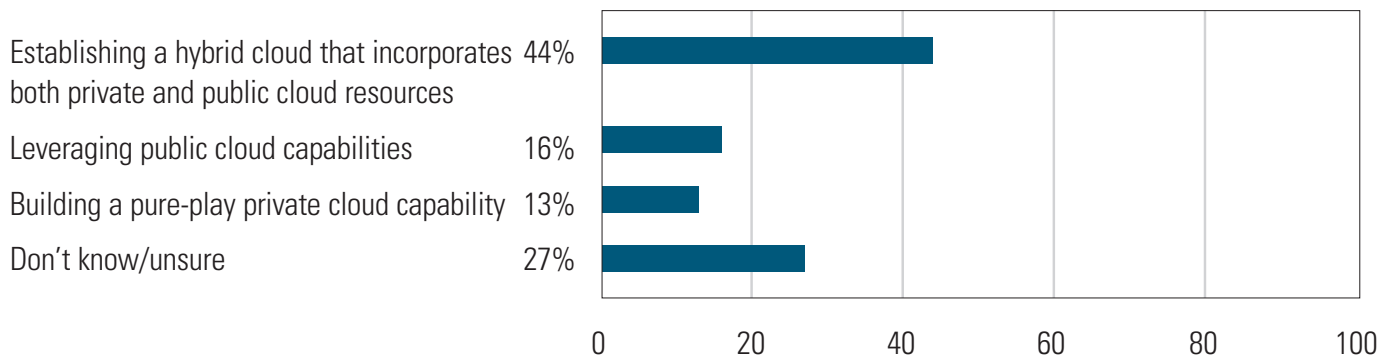
Figure 11: Who manages and provides (or will manage and provide) your cloud services?

IT department	67%
Cloud provider	27%
Service provider, outsourcer, managed hosting services provider	21%
Individual business units	7%
Independent subsidiary/division	4%
Other	1%
Don't know/unsure	11%
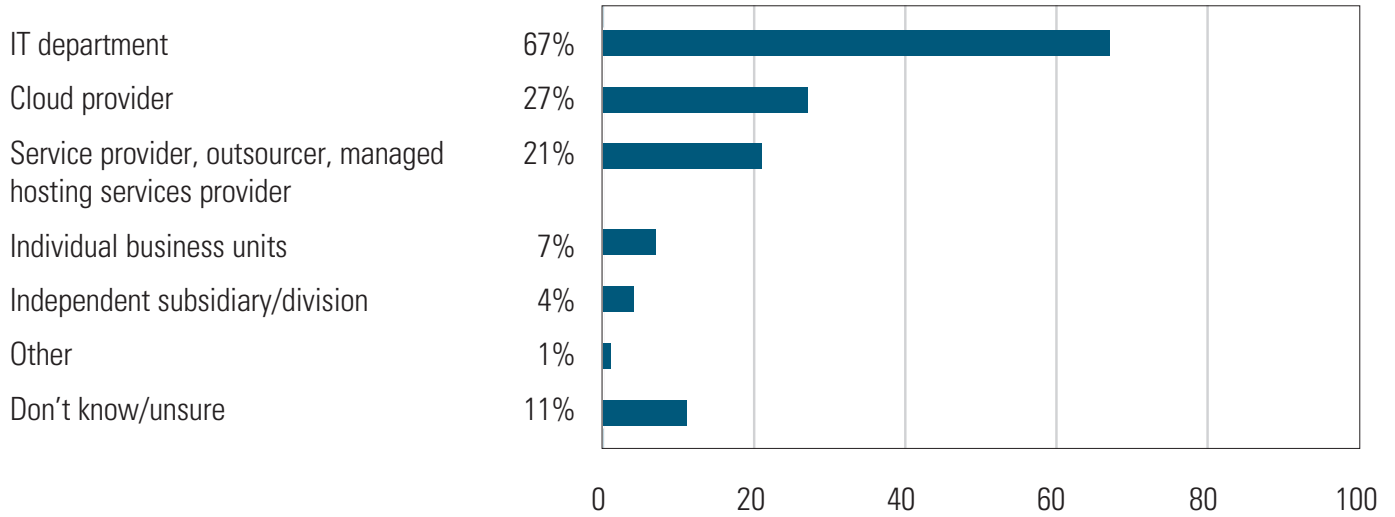
Figure 12: To what extent has your organization adopted cloud computing (private, hybrid, or public) to develop and/or manage enterprise applications and data?

Most of our mission-critical applications and/or dev/test are run on cloud	7%
Some core mission-critical applications and/or dev/test are run on cloud	24%
We are in the planning stages for determining the best approach to cloud computing in our enterprise	17%
We have cloud applications at the periphery of our enterprise, for point solutions or dev/test	23%
No significant cloud deployments at this time	22%
Don't know/unsure	7%

Figure 13: How many cloud services are used by your organization, and how many do you expect to be in use 2 years from now?

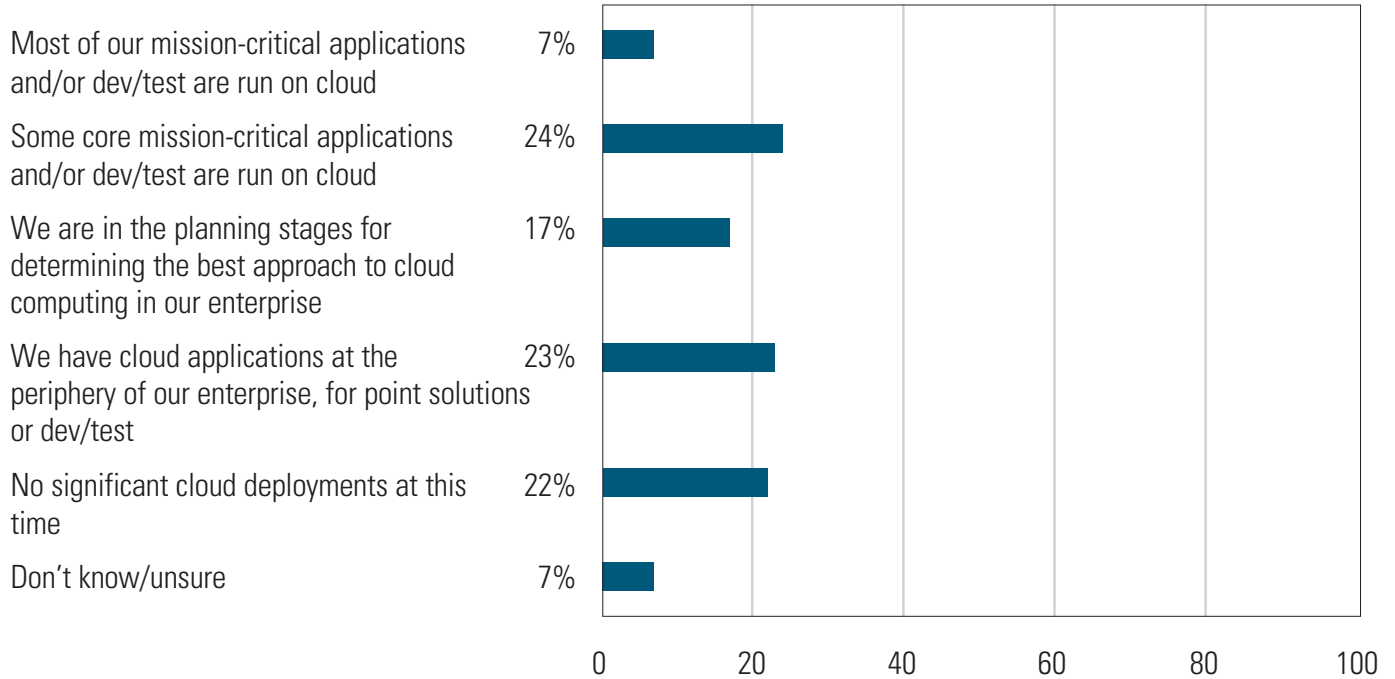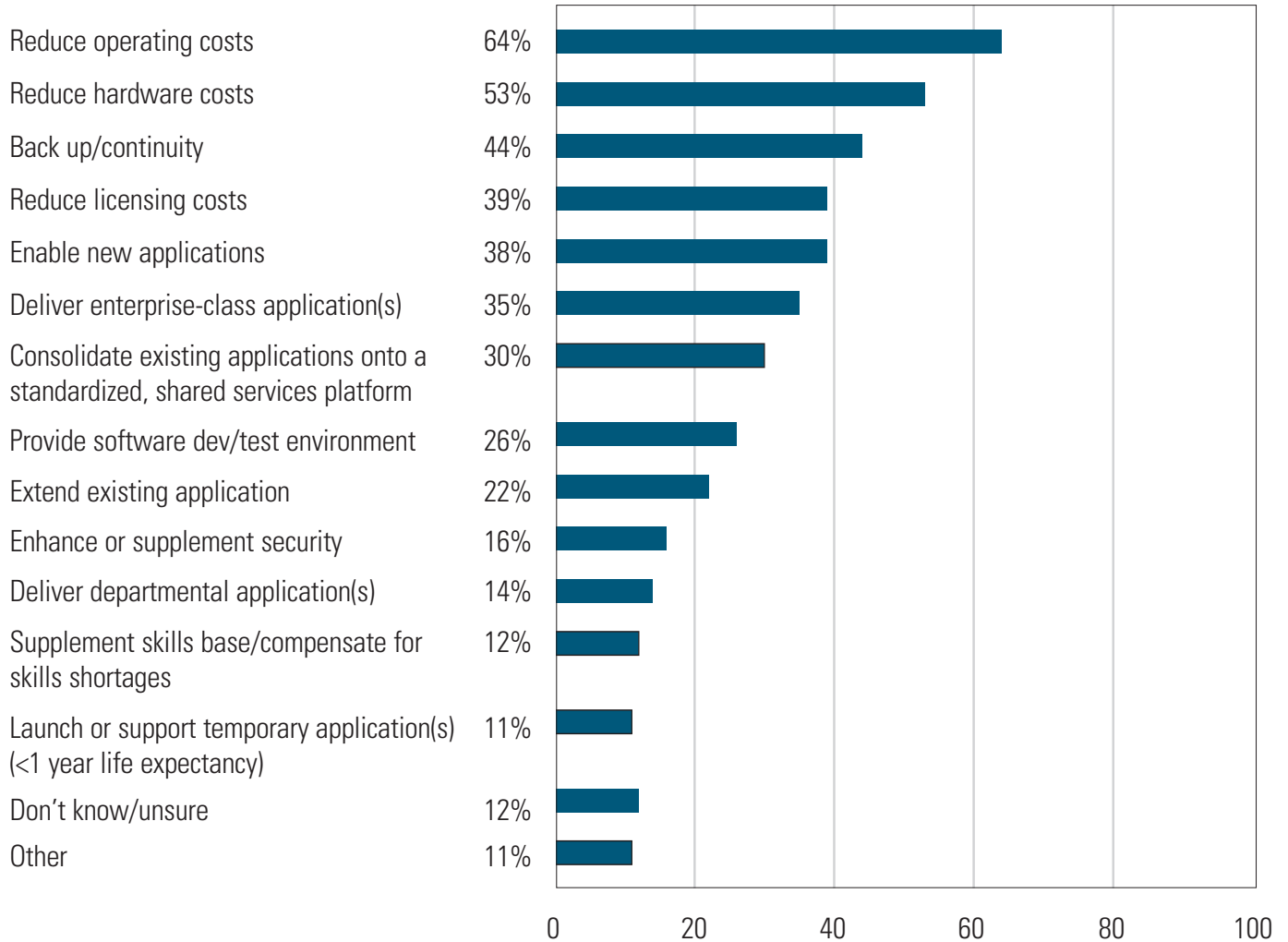|	Currently	In 2 years
None at this time	24%	4%
1% to 10%	48%	24%
11% to 25%	9%	22%
26% to 50%	2%	12%
More than 50%	6%	20%
Don't know/unsure	13%	27%

Figure 14: What are the top business needs your organization is meeting by using cloud services?

Business Need	%
Reduce operating costs	64%
Reduce hardware costs	53%
Back up/continuity	44%
Reduce licensing costs	39%
Enable new applications	38%
Deliver enterprise-class application(s)	35%
Consolidate existing applications onto a standardized, shared services platform	30%
Provide software dev/test environment	26%
Extend existing application	22%
Enhance or supplement security	16%
Deliver departmental application(s)	14%
Supplement skills base/compensate for skills shortages	12%
Launch or support temporary application(s) (<1 year life expectancy)	11%
Don't know/unsure	12%
Other	11%

ENTERPRISE CLOUD CAPABILITIES

Cloud is increasingly seen as a highly agile and robust platform for enterprise application development. More development work is going to the cloud. Database backup and disaster recovery, along with enterprise applications, are the areas seeing the greatest returns from cloud implementations.

For data managers and professionals, cloud computing offers access to resources offering greater capacity, resiliency, and flexibility. For those also engaged in development and integration activities—or among developers themselves—cloud offers new pathways to run and test data applications, as well as provision and update tools.

As the survey shows, a key use case for cloud—both on-premises and third-party provided—is serving as dev/test environments that can be rapidly spun up by development teams. For enterprises in this survey, cloud is clearly the platform that will support a great deal of future development. Close to one-third of respondents, 31%, indicate that significant portions of their development work (defines as greater than 25% of such work) will be conducted on cloud platforms, versus work on local workstations. This is up from 8% using cloud for a significant portion of their work today. Clearly, enterprises are recognizing how supporting developers on the cloud will ensure greater

consistency across their development environments, as well as access to the latest and greatest tools. (See Figure 15.)

Much of the development work taking place on cloud platforms isn't just limited to one-off or departmental apps. When looking at the types of projects developers are doing in the cloud, enterprise app development dominates. Close to half, 44%, report working with enterprise apps, which include Java and middleware. Another 41% are working on cloud-based database projects, which portends the rise of DBaaS documented in the previous section. (See Figure 16.)

There are a number of qualities data managers and professionals seek in cloud, starting with data security, cited by eight in ten. At least three in four also seek the ability to maintain continuity and provide disaster recovery capabilities. Fast resource provisioning also weighs in at the top of managers' and professionals' wish lists, cited by 71%. (See Figure 17.)

Figure 15: How much of your development is currently being done in the cloud, versus on premises or with localized workstation tools today, and how much will be in the cloud 2 years from now?

(Includes all cloud types—public, private, hybrid.)

	Currently	In 2 years
None at this time	37%	8%
1% to 10%	33%	13%
11% to 25%	11%	24%
26% to 50%	2%	13%
More than 50%	6%	18%
Don't know/unsure	11%	22%

Figure 16: What types of projects are developers in your organization doing in the cloud?

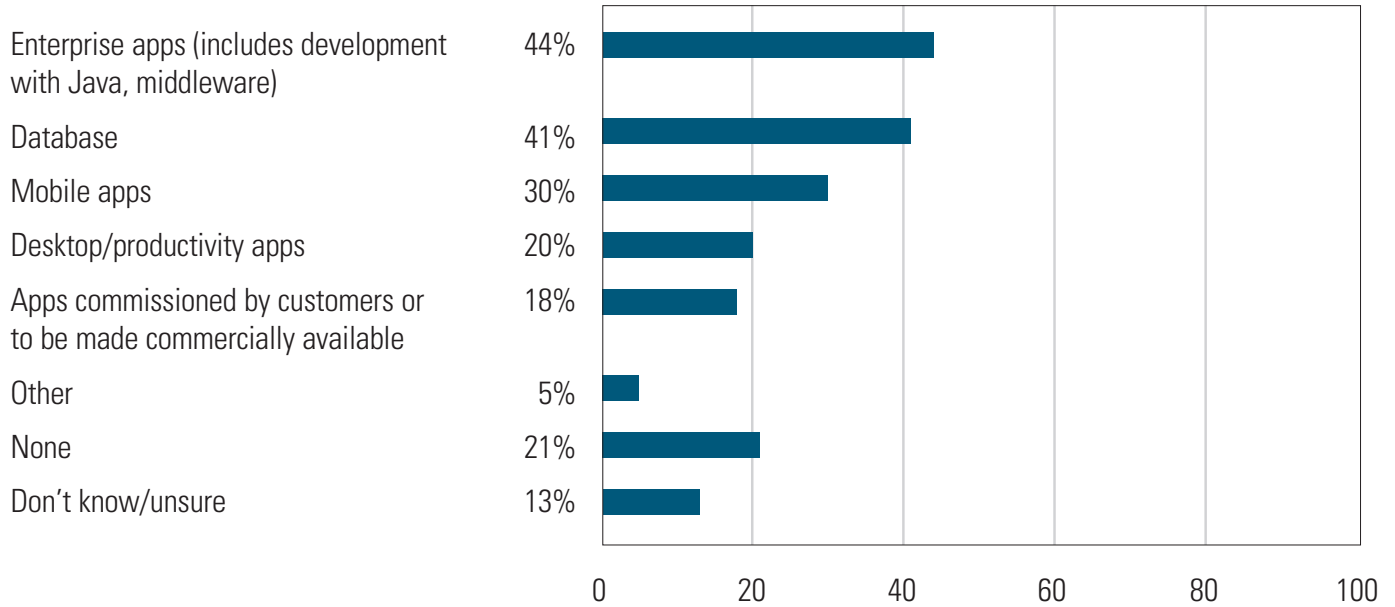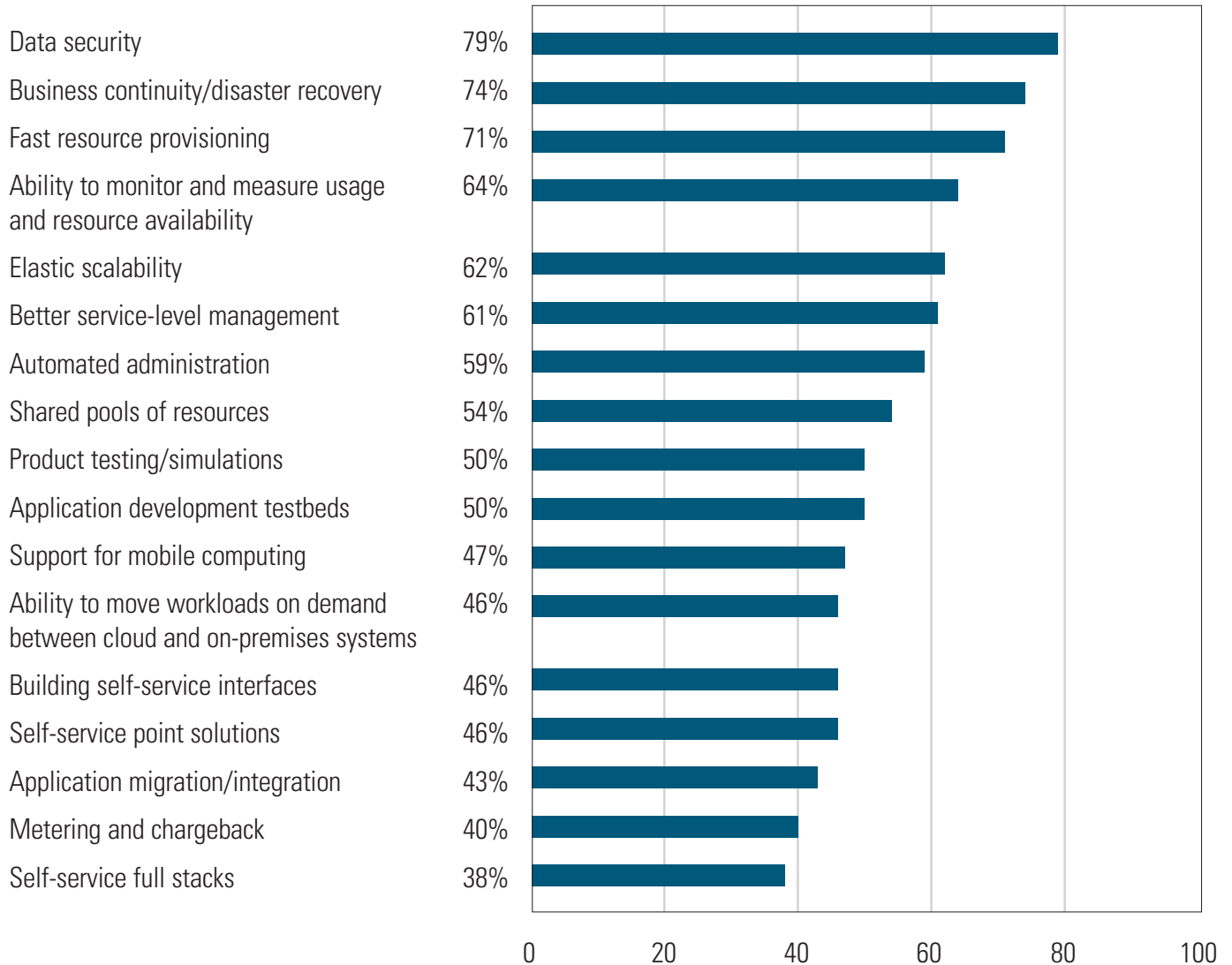| Project Type	Percentage
Enterprise apps (includes development with Java, middleware)	44%
Database	41%
Mobile apps	30%
Desktop/productivity apps	20%
Apps commissioned by customers or to be made commercially available	18%
Other	5%
None	21%
Don't know/unsure	13%

Figure 17: Please rate the importance of the qualities you seek in cloud

(Percentage assigning a "4" or "5" rating, from 1=not important to 5=extremely important)

Quality	Percentage
Data security	79%
Business continuity/disaster recovery	74%
Fast resource provisioning	71%
Ability to monitor and measure usage and resource availability	64%
Elastic scalability	62%
Better service-level management	61%
Automated administration	59%
Shared pools of resources	54%
Product testing/simulations	50%
Application development testbeds	50%
Support for mobile computing	47%
Ability to move workloads on demand between cloud and on-premises systems	46%
Building self-service interfaces	46%
Self-service point solutions	46%
Application migration/integration	43%
Metering and chargeback	40%
Self-service full stacks	38%

DATABASE DESIGNED FOR THE CLOUD

Significant segments of Oracle Database customers are adopting a range of technologies to move their DBaaS efforts forward in their organizations. Oracle Multitenant, Oracle Enterprise Manager, and Oracle Exadata are becoming mainstays for DBAs and professionals seeking to deliver information, on-demand, to whomever and wherever it is needed.

Oracle Multitenant: Oracle Multitenant—a major new architecture introduced with Oracle Database 12*c*—offers a cloud-scale database platform that supports the large variety of applications and data environments that is part of today's enterprises. Close to half of respondents are looking at Oracle Database 12*c* and Oracle Multitenant to support their efforts to deliver DBaaS on-premises or in the cloud? (See Figure 18.)

Consolidation is the key advantage sought among data managers and professionals working with Oracle Multitenant. The ability to manage multiple databases as a single, consolidated environment was considered the leading benefit. Support for multiple applications is also seen as a key benefit. (See Figure 19.)

What are organizations' main use cases for Oracle Multitenant? The survey finds an even distribution of use cases between DBaaS, consolidation and dev/test—pointing to the versatility of this technology as organizations move into the cloud data space. There is even a segment of managers and professionals indicating that Oracle Multitenant plays a part in rolling out SaaS-based applications. (See Figure 20.)

The survey shows a great deal of transformation taking place within database environments, as cloud computing opens up new possibilities. When asked about the state of their organizations' database architectures prior to their Oracle Multitenant implementation, respondents indicate there has been a lot of migration from VMs, as well as from standalone. This aligns with the findings, mentioned above, which indicate heightened interest in consolidation. To a large degree, cloud computing represents the next great leap from virtualization. (See Figure 21.)

Oracle Exadata Cloud Service: Another key piece of the DBaaS story, Oracle Exadata Cloud, is also being considered as part of respondents' approaches to delivering DBaaS to their enterprises. Currently, one in four is evaluating adoption of the technology, in which all of the Exadata Database Platform capabilities are available as a cloud service. Adoption of Oracle Exadata Cloud Service also weighs in as part of enterprises' consolidation efforts running up to DBaaS. When asked to rate the relative importance of Exadata Cloud's potential benefits on a scale of 1 to 5, data managers and professionals place consolidation density at the top of the list, with a rating of almost 4. Security, scalability, and availability also are seen as critical, each rating a 3 out of 5. (See Figure 22.)

Oracle Enterprise Manager: Rolling out DBaaS-based services across enterprises requires a great deal of visibility to ensure the availability of IT resources and services are running at peak performance, whether it's in a private or public cloud or even in a hybrid model. For these reasons, more the two in five data managers and professionals in the survey are looking at Oracle Enterprise Manager as an important approach to delivering and managing DBaaS in the cloud. (See Figure 23.) The most important consideration in adopting Oracle Enterprise Manager is the ability to support service catalogs, a critical element in service-oriented architecture and cloud computing. (See Figure 24.)

Oracle's Cloud Strategy: What resonates most with IOUG members is that the Oracle Database used on-premises is also used in the Oracle Cloud, incorporating the same availability and security features. The service provides hybrid cloud support, and rapid provisioning, along with migration support to and from the cloud all from a single vendor. (See Figure 25.)

Figure 18: Are Oracle Database 12*c* and Oracle Multitenant being considered in your approach to delivering DBaaS on-premises or in the cloud?
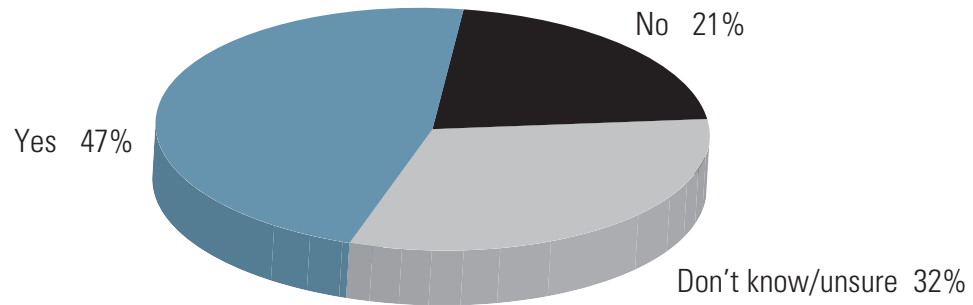
Yes   47%

No   21%

Don't know/unsure   32%

Figure 19: Which benefits of Oracle Multitenant had the biggest impact on your decision to deploy this solution?

Benefit	Percentage
Ability to manage many databases as one	32%
Greater database and application consolidation density	30%
Greater consolidation density	27%
More applications per server	26%
Standardized procedures and service levels	24%
Enable self-service provisioning	21%
Greater agility	24%
Portability through "pluggability"— easily plug into the cloud	24%
OpEx cost savings	23%
Ease of use	20%
CapEx cost savings	19%
Applications run unchanged	18%
Other	4%
Don't know/unsure	31%

Figure 20: What is your use case for Oracle Multitenant?

Database as a Service	40%
Database consolidation	40%
Development and testing	36%
Software as a Service	18%
Other	3%
Don't know/unsure	32%
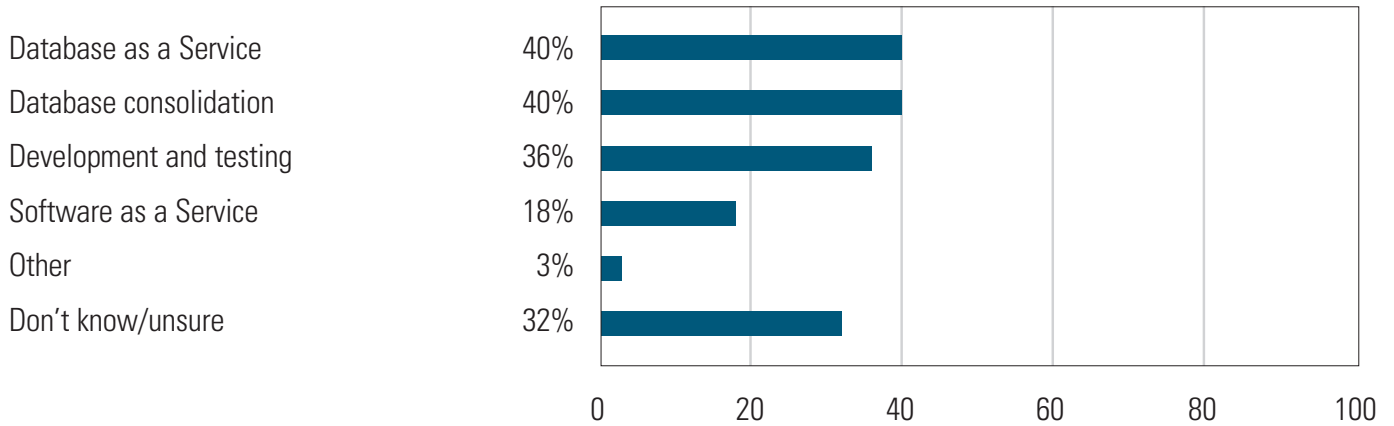
Figure 21: What was your database architecture prior to your Oracle Multitenant implementation?

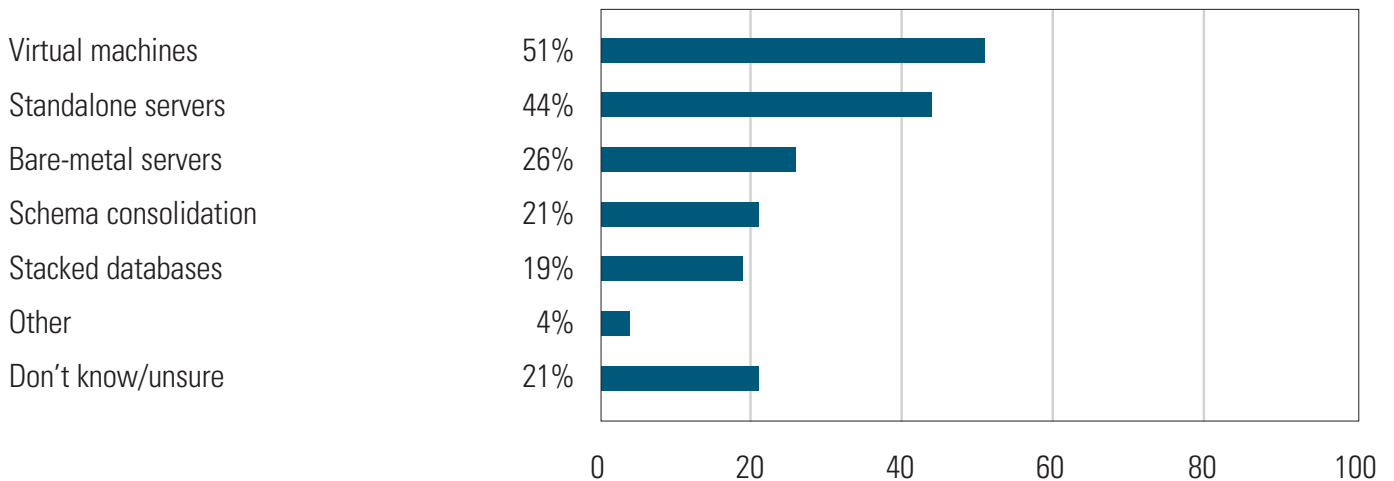|	
Virtual machines	51%
Standalone servers	44%
Bare-metal servers	26%
Schema consolidation	21%
Stacked databases	19%
Other	4%
Don't know/unsure	21%

Figure 22: Which benefits are the most important to you in considering Oracle Exadata?

(Based on a scale of 1 to 5)

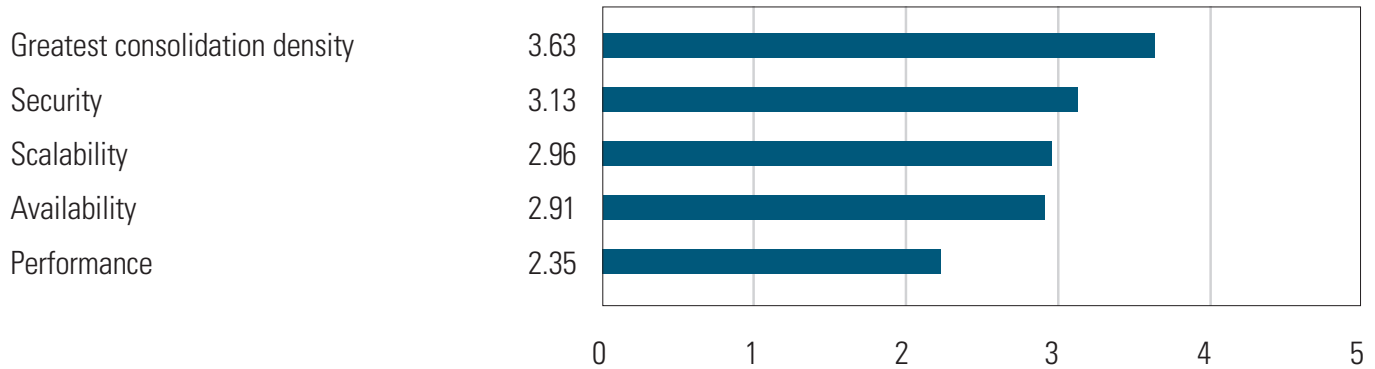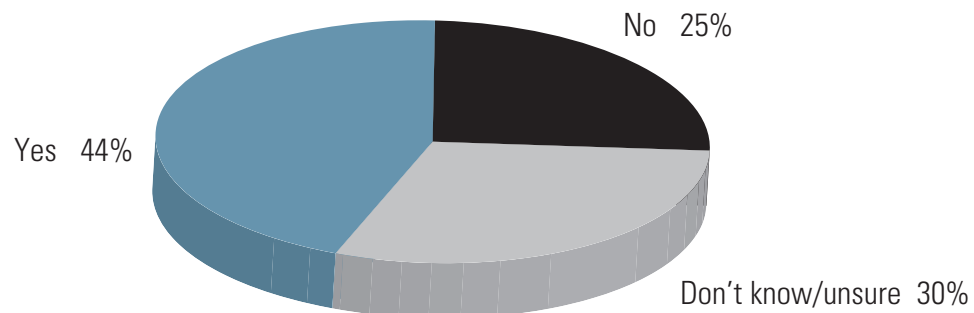| Benefit	Score
Greatest consolidation density	3.63
Security	3.13
Scalability	2.96
Availability	2.91
Performance	2.35

Figure 23: Is Oracle Enterprise Manager being considered in your approach to delivering DBaaS in the cloud?

No   25%

Yes   44%

Don't know/unsure 30%

(Total does not equal 100% due to rounding.)

Figure 24: Which benefits are the most important to you in considering Oracle Enterprise Manager?

(Based on a scale of 1 to 5)

Benefit	Score
Service catalogs	2.5
Simplified provisioning	1.88
Centralized control over on-premises and cloud environments	1.62
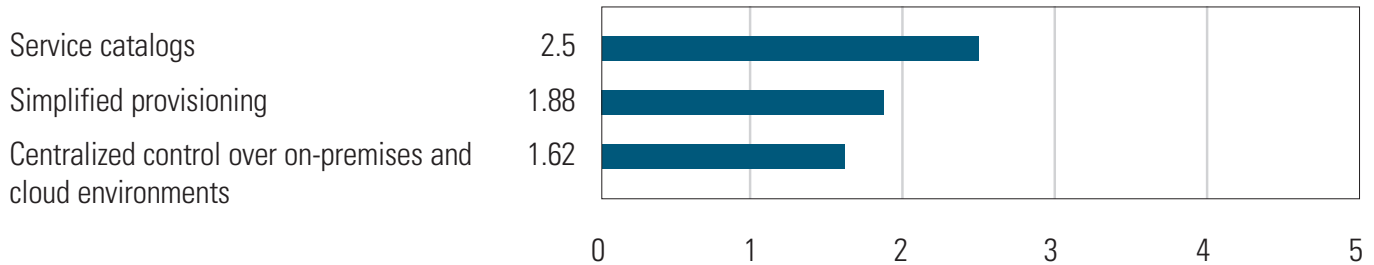
Figure 25: Which benefits of Oracle Public Cloud made the biggest impact on your decision to deploy this solution?

(Based on a scale of 1 to 10)

Benefit	Score
Full hybrid cloud support	5.45
Specific Oracle technology	5.45
Rapid or simplified provisioning	5.42
Single vendor solution	5.29
Vendor knowledge and experience	5.28
Ease of migration to and from the cloud	5.23
Performance	4.54
Availability	4.26
Security	4.07
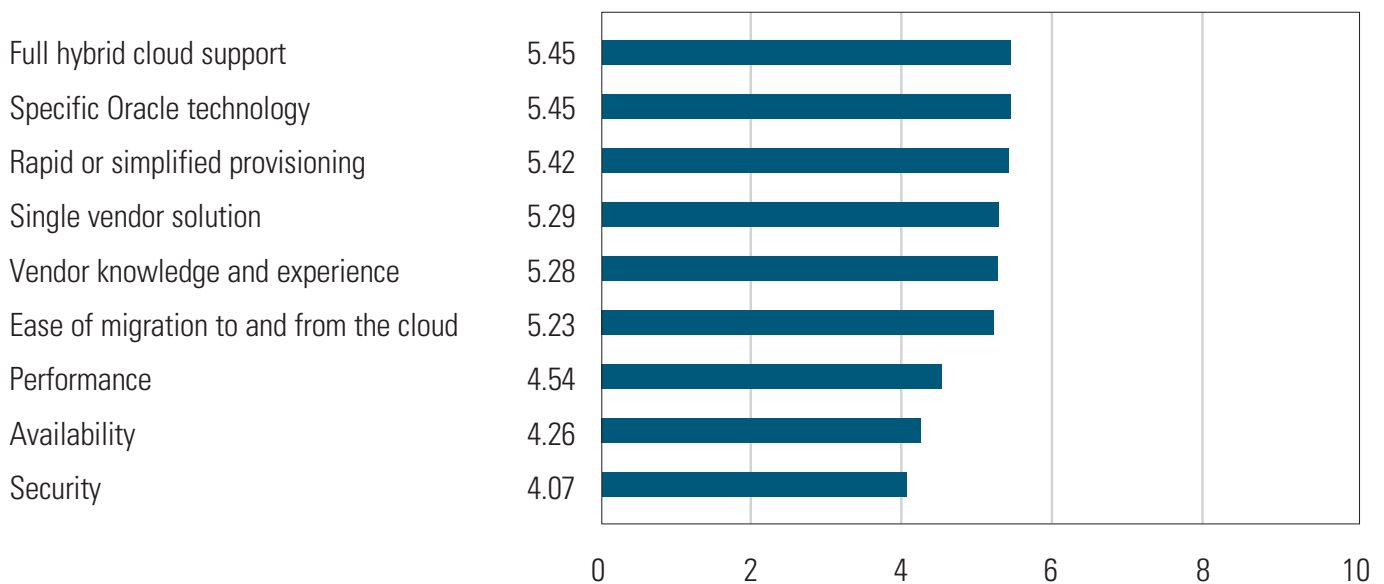
DEMOGRAPHICS

Figure 26: What is your primary job title?

Database administrator (DBA)	36%
Director/manager of IS/IT or computer-related function	11%
IT consultant	7%
Analyst/systems analyst	7%
Chief information officer/CTO/ vice president of IT	5%
Programmer/developer	4%
Data architect	4%
Executive/management level for the business	4%
IT operations manager	3%
Systems administrator	3%
Manager of a business unit (other than computer-related)	2%
Project manager	2%
Other	10%

Figure 27: How many employees are in your entire organization?

1 to 500 employees	30%
501 to 1,000 employees	7%
1,001 to 5,000 employees	20%
5,001 to 10,000 employees	12%
More than 10,000	30%
NA	1%
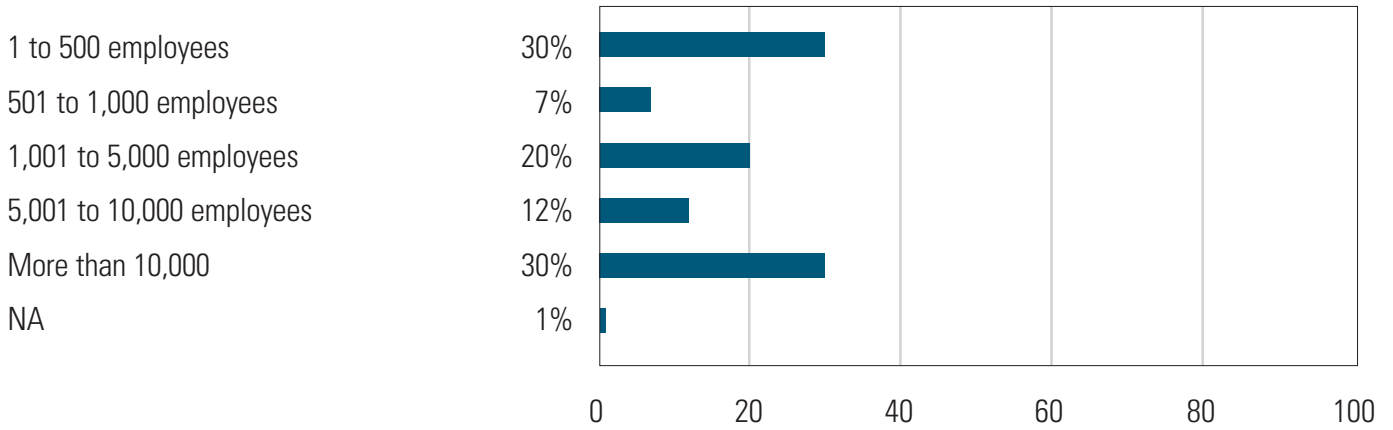
Figure 28: What is your primary industry?

Industry	Percentage
IT services/consulting/system integration	23%
Financial services	11%
Software/application development	11%
Education (all levels)	9%
Government (all levels)	8%
Utility/telecommunications/transportation	7%
Healthcare/medical	5%
Business services	4%
Insurance	4%
Manufacturing	3%
High-tech manufacturing	2%
Media/entertainment	2%
Retail/distribution	1%
Consumer services	1%
Other	8%